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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

4890705

KOREA - AGRICULTURAL RESEARCH PROJECT

A.I.D.
Reference Center
Room 1656 NS

AID-DLC/P-2014

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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

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AID-DLC/P-2014
November 27, 1973

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: KOREA - Agricultural Research Project

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed \$5,000,000 to the Government of the Republic of Korea to be made available to assist in financing the foreign exchange costs of certain laboratory and other equipment, materials and suppliers, including training, required to implement a project of agricultural research in the Republic of Korea.

This loan proposal is scheduled for consideration by the Development Loan Staff Committee at a meeting on Wednesday, December 5, 1973.

Development Loan Committee
Office of Development
Program Review

Attachments

Summary and Recommendations
Project Analysis
ANNEXES A - C

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Korea: Agricultural Research Project (\$5 million)

November 27, 1973

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AID-DLC/P-2014
November 27, 1973

KOREA: AGRICULTURAL RESEARCH PROJECT

SUMMARY AND RECOMMENDATIONS

1. Borrower: The Government of the Republic of Korea (ROKG). The Project will be implemented by the Office of Rural Development (ORD), of the Ministry of Agriculture and Fisheries (MAF).
2. Amount of Loan: \$5 million.
3. Terms: Repayment within 40 years, including a ten-year grace period; interest at 2% annually during the grace period, and 3% thereafter.
4. Purpose: To assist the ROKG in its efforts to increase food production through higher yields from basic crops, and through more efficient land utilization.
5. Project Description: The Project will consist of a multidisciplinary research program directed toward (a) varietal improvement of basic food and feed crops, and (b) improved cropping systems (i.e., double-cropping). Proceeds of the proposed A.I.D. loan will be used over a five-year period to finance the foreign exchange costs of technical assistance (expatriate scientists and services of intermediaries), training for Korean scientists, and equipment and commodities necessary to carry out the program.
6. Total Project Costs: The total cost of the Project is estimated at \$8,125,000, of which \$5,000,000 represents foreign exchange costs, and \$3,125,000 (equivalent) represents local currency costs. All foreign exchange costs will be financed by the proposed A.I.D. loan; the ROKG will finance all local currency (won) costs (see Section IV.B).
7. Other Sources of Financing: The IBRD, FAO and UNDP are assisting the ROKG in various programs related to the objectives of this crop improvement research project. As these programs are complementary to the research project, they will be continued. However, none of these donors are prepared to finance the project proposed herein.
8. Mission Views: USAID/Korea views this Project as being a key element of its current program which emphasizes support for the ROKG's efforts to speed the development of the rural/agricultural sector, and accordingly recommends early authorization of the proposed loan.
9. Issues: None.
10. Statutory Criteria: All statutory criteria have been satisfied (see Annex C).

✓
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11. Recommendation: Authorization of a loan to the ROKG in the amount of \$5 million to finance the foreign exchange costs of the Project, subject to the terms and conditions stated in the Draft Loan Authorization attached as Annex A.

13 USAID Project Committee

Agricultural Advisor and Chairman
Loan Officer
Legal Advisor

Francis C. Jones, R&D
Robert A. Cahn, DLD
John W. Roxborough, LEG

13 AID/W Project Committee

Loan Officer and Chairman
Agricultural Advisor
Country Desk Officer
Legal Advisor

Richard B. Perry, ASIA/CD
Charles Antholt, ASIA/TECH
Blaine Richardson, ASIA/EA/K
Jay A. Burgess, GC/ASIA

I. Background and Introduction

A. Agriculture and the Korean Economy

The dramatic growth and development of the Korean economy since the early 1960's is a matter of historical record which has been amply documented in reports and publications of the major international lending institutions and the Government of Korea (ROK) itself. It is also well recognized by the ROK and the same international lenders that the pattern of development under the first two Five Year Plans (1962 - 1966, and 1967 - 1971) heavily emphasized basic infrastructure and export-oriented industry, at some expense to the agricultural sector. For example, the the ten-year period ending in 1969, the average annual growth rate for the total economy was 8.2 percent, while the rate for agriculture, forestry and fisheries was 4.2 percent. The growth rate for agriculture alone - as separated from forestry and fisheries - was only 3.8 percent. In the same period, the agricultural sector's contribution to GNP slipped from 42.3 percent to 28.4 percent. Korea's increasing market requirements have outpaced the agricultural sector's productive capacities, particularly in the area of food grains, resulting in an increase in the agricultural products trade deficit from \$64 million in 1961 to \$363 million 1971. Rural income per household has increased more slowly than urban household income - 60% from 1961 to 1971 for rural households, as compared to over 100% for urban families.

Although the performance of the agricultural sector in recent years has been relatively unimpressive when compared to the other sectors of the economy, it continues to be a major factor in the total economic life of the country. As noted above, agriculture contributes nearly 30% of GNP, employs nearly half the total labor force, and furnishes raw materials for a significant portion of the country's industry.

Notwithstanding the fact that the agricultural sector was relegated to a back seat during the first two Five Year Plans, the importance of the sector to the country is, and always has been fully appreciated by the people and institutions developing and implementing those plans. The decisions to emphasize the non-farm sectors during the first two Plans would appear to have achieved the hoped-for-goal, i.e., rapid industrialization. Now, having reached a satisfactory rate of growth in the non-farm sectors, more attention can be given to the needs of agriculture and rural Korea, as is reflected in the Third Five Year Plan (1972-1976). Greater equity in income distribution, meeting social needs through improved rural infrastructure, increased production (especially in the critical areas of food grains), and development of land and water resources, are major objectives of the current strategy.

B. Korean Agricultural Sector Analysis

B. A.I.D. has provided support in a number of ways for the ROKG's efforts to quicken the pace of development in the agricultural sector. Perhaps the most notable supportive activity to date, and the one which promises to be of considerable long-term benefit, is the analysis of Korea's agricultural sector, and recommended development strategies, completed in mid-1972. The analysis was performed by a team composed of members of the Department of Agricultural Economics, Michigan State University, and the Agricultural Economics Research Institute, Ministry of Agriculture and Fisheries (MAF), ROKG. Foreign exchange costs of the activity (i.e., costs of the Michigan State input) were grant-financed by A.I.D. The analysis included a separate study of areas of potential development investment within the sector. Based on a review of the findings of the overall sector analysis, the investment study team identified - in consultation with A.I.D. and the ROKG - the following three broad areas in which to concentrate their efforts: (1) agricultural research, (2) agricultural input and product marketing, and (3) land and water resource development. Upon completion of the study, recommendations were made for investment in eight specific activities, in the following order of priority:

- Agricultural Research
- Transportation (Roads)
- Irrigation
- Drainage
- Credit, and ROKG Grain Management Policy
- Market Information
- Storage Facilities (for grain and pulses)
- Upland Development

C. Need for the Research Project

The number one investment priority given the area of agricultural research rests on several considerations. The scarcity of arable land, coupled with the ever-increasing food requirement (especially for food grains), results in much importance being placed on efficient use of land resources. Although intensive farming practices have been developed to a relatively high degree in Korea, there is considerable potential for further exploitation of the only remaining land frontiers, i.e. underutilized winter paddies and the uplands, through the development of shorter-maturing food crops and forages. Higher yielding varieties of such crops as rice, barley, wheat, and soybeans can and should be developed. Significant successes in the foregoing areas could well be major factors in substantially increasing the rate of growth in the agricultural sector. Both the investment study and the sector analysis recognized that other areas, such as marketing, food processing and food utilization research are important, but concluded that it is first necessary to get higher yields and increased hectarages in the basic crops.

In the judgment of the investment study team, the major constraint - to achieving the necessary breakthroughs in crops improvement - consists of inadequacies in the existing indigenous research effort. The inadequacies are primarily in the area of biological technology, but institutional weaknesses also contribute to the problem. As a result, there has been a failure to concentrate on the country's top agricultural research priorities, and an insufficiency of resources - especially well-trained and experienced research scientists - to deal with these priorities. The lack of concentration is due primarily to a scatteration and duplication of effort which, in turn, stems from a dispersion of the country's agricultural research facilities, talents and responsibilities.

The project proposed herein is designed to correct the deficiencies of the existing system in three basic ways: (1) providing the lacking resources, i.e., qualified scientists, equipment and materials, scientific literature, and training for Korean researchers; (2) approaching the research task with an organizational and administrative concept planned so as to avoid the existing inefficiencies; and (3) directing the research effort specifically toward identified priorities and stated goals within those priorities.

This loan proposal is based on a detailed application prepared by the Office of Rural Development (ORD), MAF, and submitted to A.I.D. through the Economic Planning Board (EPB) of the ROKG. It should be noted that ORD received valuable assistance in the preparation of their application and in planning the research project from Dr. Herbert Albrecht, Director of the International Institute of Tropical Agriculture, Ibadan, Nigeria, and from Dr. James Cobble, former Dean of the College of Agriculture, University of Rhode Island, as well as from A.I.D. direct-hire staff. Dr. Albrecht visited Korea for a month in the Summer of 1973 for this purpose at the invitation of A.I.D. and the ROKG; Dr. Cobble recently completed a two-year resident consultancy with the College of Agriculture, Seoul National University (COA/SNU), located adjacent to the ORD compound at Suwon.

II. Agricultural Research in Korea

A. Institutions and Their Crop Research Activities

Agricultural research in Korea is carried out primarily by ORD, whose headquarters and main research facilities are located at Suwon, approximately 40 miles south of Seoul. The crop improvement research, per se, is conducted at the Crops Experiment Station, which has branches at Mokpo and Kangwha, and sub-stations at Cholwon and Kwangju. In addition, there are major experiment stations at Honam and Yongnam. The Institute of Agricultural Sciences (IAS), formerly called The Institute of Plant Environment, also located in the ORD compound at Suwon, performs research related to pests, diseases, fertilizers, soils and agricultural chemistry. Important crop improvement research has also been carried out at COA/SNU, which formed a multidisciplinary rice research team to continue the progress previously made (by ORD and

B
College of Agriculture
Seoul National University

COA/SNU) in breeding the new variety known as IR667, or "Tongil", a high-yielding strain which is resistant to blast disease and highly responsive to nitrogenous fertilizers.

Although agricultural research in Korea has made significant accomplishments (e.g., IR667), it is recognized by both Korean and foreign observers that the overall effort suffers from scatteration, duplication, and inadequately trained manpower, resulting in insufficient concentration on the country's top research priorities; this situation is illustrated in Subsection II.C. below.

With the exception of COA/SNU's activities mentioned above, the colleges of agriculture in Korea are viewed almost totally as training units for students, and their potential contribution to an agricultural research program is virtually untapped. Such colleges training students for research and guidance service (extension) at the B.S., M.S. and Ph. D. levels have proliferated in Korea and, with few exceptions, they lack properly trained faculty, adequate libraries and similar reference sources, not to mention research laboratories, facilities and equipment which are virtually non-existent.

B. External Assistance Related to Crop Research

There are currently three projects underway in Korea, all assisted by external donors, which relate to crop improvement research.

1. Plant Protection and Training (UNDP/FAO) - to strengthen plant protection training and guidance service; to conduct research on incidence and extent of crop pests and diseases (e.g., nematodes, rodents and weeds); to provide training in modern methods of analyzing pesticides and their residues; and to provide training in monitoring levels of pest resistances to pesticides, and training in evaluating the suitability of alternative compounds and methods of use.

2. Soil Fertility and Soil Survey (UNDP) - to assist the MAF in the collation and utilization of data collected during a recently completed nation-wide survey and classification of Korea's soils.

3. Pasture Improvement (West Germany) - to conduct research on the exploitation of feed resources; to introduce, select and breed pasture grass varieties adaptive to Korean conditions; and to research the conversion of unimproved hills and wasteland into pasture-land.

C. Other Entities Performing Agricultural Research in Korea

1. The Institute of Agricultural Engineering and Utilization (IAEU)

IAEU is located at the main ORD compound, and it has a long history of providing practical services and improved items of

machinery for rural people. Its research efforts cover the entire range of farm machinery used for rice and other food crops, to include mechanical and chemical milling of rice, barley and other grains, as well as grain drying and storage equipment. Systems of effective utilization of ground water and other sources of water relating to farm operations are also receiving attention. Important contributions of IAEU include a power-propelled potato harvester, a mole drainage drill for tidal land areas, a rice harvester, and methods of preserving fruit juices for local consumption and for export.

2. Livestock Experiment Station - Forage Section

This unit has the responsibility of carrying out research on forage crop breeding and cultivation, on establishment and utilization of grassland, on selection of multi-cropping systems using forage, and on the production of hay, green feed, corn and sweet potatoes for silage.

3. National Livestock Breeding Station

One of the minor objectives of this station's program is the improvement of pasture and forage production for utilization by dairy and beef cattle and to provide technical training in livestock feeding and management, especially pasture management. At a major branch station, emphasis is placed on improvement and utilization of native grasses, and on the establishment of pastures for sheep production.

4. Provincial Offices of Rural Development (PORD)

Each of the nine PORD Directors has under his supervision and control a Research Experiment Station. The stations vary considerably in size, facilities and operating budget, which comes from the provincial governments; staff salaries, however, are paid from the National budget.

The PORD stations are extensions of the main ORD research station and, as such, conduct applied research. The main research functions are to conduct seed and plant adaptation trials and seed and plant multiplication, to conduct practical research involving sericulture, to carry out improved livestock breeding trials, artificial insemination services and forage crop experiments, and to furnish veterinary diagnostic services to livestock owners.

These stations have a long history of successful operation and are important means of "proving" research results at the farmer level. Staff training and farmer's field days for demonstration purposes are other important functions of these installations. Using one province as an example, the following covers the crops research program of its PORD: selection of new varieties of paddy rice, upland rice, barley, potatoes; fertilization and cultivation practices, including plant density and transplant timing of IR667, and direct seeding of rice in dry and submerged paddies; improvement of soybeans, e.g., row spacing and shattering

prevention; herbicide experimentation with barley and soybeans; selection of native grasses for forage; proper seeding mixtures for permanent pasture; timing of seeding of rye grass in double cropping systems; observation of diseases on IR667; soil testing; rice blast disease prevention; fungus population and frequency of chemical application for sheath blight control; and investigations of stripe disease and plant hoppers and methods of preventing these and other diseases and insect infestations.

III. Project Description

A. Objectives

The purpose of the proposed research project is two-fold: (1) to achieve breakthroughs in varietal improvement of Korea's basic food crops, i.e., rice, barley, wheat and soybeans, and (2) to develop improved cropping systems that will make possible the optimum utilization of arable land through double cropping, including forage production to meet increasing demands for livestock feed. White potato variety research will also be carried out in support of the IBRD Seed Project (see Section VII.B). The specific targets of the research effort with respect to varietal improvement of each of the above-named crops and to improved cropping systems are as follows:

1. Rice

a. Select and develop strains that will increase the present crop experiment station yield of 4.79 MT/ha to 6.0 MT/ha by the end of 1983, and actual farm production yields from the present average of 3.25 MT/ha to an estimated 4.5 MT/ha within the same period.

b. Develop new strains which will possess the following characteristics: (1) a growth and maturity period shorter by 10 to 15 days, and at the same time be responsive to higher fertilization levels; (2) improved grain quality standards, including higher protein content, more acceptable kernel shapes, and lower amylase content; (3) tolerance for cold temperatures, especially in the seedling stage and during the ripening period (this work will be closely coordinated with selections for shorter growing period, since a shorter growth period may eliminate many of the cold - sensitivity problems); (4) resistance to blast disease, bacterial leaf blight, strip virus disease, brown leaf hopper, green leaf hopper, rice stem borer and other insects and diseases.

2. Soybeans

a. Select and develop new varieties and strains of soybeans for Korea that will increase the present crop experiment station yields from 1.98 MT/ha to target level of 3.2 MT/ha, and increase farmer's yields from 0.8 to 1.3 MT/ha by the end of 1983.

b. Select and breed for a plant type which exhibits

the following characteristics: (1) improved response under conditions of higher plant density (thereby capturing more light energy); (2) resistance to lodging, while being more responsive to higher fertilization levels; (3) higher protein and oil content; (4) a shorter growing period; (5) resistance to soybean mosaic virus, bacterial pustule, bacterial blight, downy mildew, frogeye, target spot, and root knot.

c. Special consideration should also be given, for the first few years of the program, to cultural practice research because of the very low national average production and the lack of available research information on this crop.

3. Barley

a. Select and develop new strains which will increase the present crop experiment station yield level of 2.79 MT/ha to 3.6 MT/ha, and increase farm yields from 2.04 to 3.0 MT/ha, within a ten year period.

b. Select and breed for a variety with the following characteristics: (1) at least a 10 to 15-day shorter maturity period than that of varieties presently in use; (2) higher tolerance to cold temperatures, and to less well-drained paddy soils; (3) responsiveness to higher fertilization levels without having a tendency to lodge; (4) resistance to commonly occurring diseases and insect pests in Korea.

4. Wheat

a. Select for and develop new varieties, which will increase present crop experiment station yields from 4.30 MT/ha to 5.2 MT/ha within a ten year period, and on-farm yields from an average of 2.24 to 4.0 MT/ha.

b. Breed for the following characteristics: (1) a shorter growing period of approximately 15 to 20 days (in order to incorporate more fully into a double cropping system on paddy lands); (2) improved milling qualities; (3) higher protein content; (4) more desirable baking qualities; (5) resistance to diseases such as rust and smut, as well as damaging insect pests; (6) greater tolerance to cold and to less well-drained paddy soils.

5. Cropping Systems (including forage crops)

a. Develop programs or sets of land use recommendations relative to rice, barley, wheat, soybeans and forages, including corn silage.

b. Develop sets of cultural practice recommendations for the crop combinations, particularly in relation to idle winter paddy land.

c. An additional activity will be that of providing policy makers with agro/economic information relative to what food and feed production potentials exist under alternate crop combinations and cost/price structures.

d. Research efforts also will be directed to soil fertility, soil physics, paddy drainage, Ph levels and other environmental and general cultural practices that affect multi-cropping plans, to include the economic, sociological and agricultural engineering aspects of compatible winter and summer cropping systems.

e. Active consideration under this phase of the program will also be given to conservation aspects, including leaching, erosion, improved water management, soil organic matter levels and other related factors. These aspects become increasingly important as more upland cropping is initiated.

6. Potatoes

a. Select and/or develop new improved varieties which are particularly resistant to seed-borne diseases, such as those caused by viruses.

b. Improve cultural practices and insect control measures.

c. Develop improved methods of seed testing, production and storage.

d. Research potato processing and marketing problems.

B. Method of Approach

1. Multidisciplinary Team Concept

Throughout the scientific world, the multidisciplinary approach has proven to be an efficient and effective approach to finding the needed answers in most fields. The use of several scientific specialties (e.g., pathology, entomology, physiology, breeding) in developing new varieties or upgrading the desirable characteristics of a given strain or variety of crop should produce the most rapid and economical gains.

Scientists from the Crop Experiment Station (CES), Institute of Agricultural Sciences (IAS), colleges of agriculture (SNU and other universities), plus international advisors will be utilized in the development of improved varieties of crops by this project. Once varieties are selected with the desirable traits of yield and resistance to prevailing insects and diseases under experimental condition, they will be subjected to larger field trials under various conditions throughout the country, using the most desirable cultural practices and experimental design programs to insure proper evaluation. Cultural practice research needed to supplement and take advantage of the sought-after genetic improvement will be carried out under existing CND and agriculture college

fund resources as well as A.I.D. loan funds, and close coordination between the team effort and general research assignments of the various ORD and college units will be emphasized continually.

2. Structure of the Research Program

a. General

As shown in the chart on the following page, the organizational framework of the program will have four basic units: (1) Steering Committee, to establish policy and provide broad, overall guidance in major aspects of the program; (2) Executive Unit, responsible for the operation of the program; (3) Research Committee, to provide specific guidance to the research effort, through a close association with the Executive Unit; and (4) Multi-disciplinary Research Teams, to plan and conduct the actual research. The functions, responsibilities and composition of the four units are discussed in detail below.

b. Steering Committee

This committee will establish major overall policies, set priorities for the research and training activities, receive, review and evaluate the programs and give final approval of budgets. It will also assist the effort to improve the conditions of employing and retaining a high quality staff of research and supporting personnel.

The proposed membership of the Steering Committee, as listed below, has been determined on the basis of the level of responsibility of the indicated position:

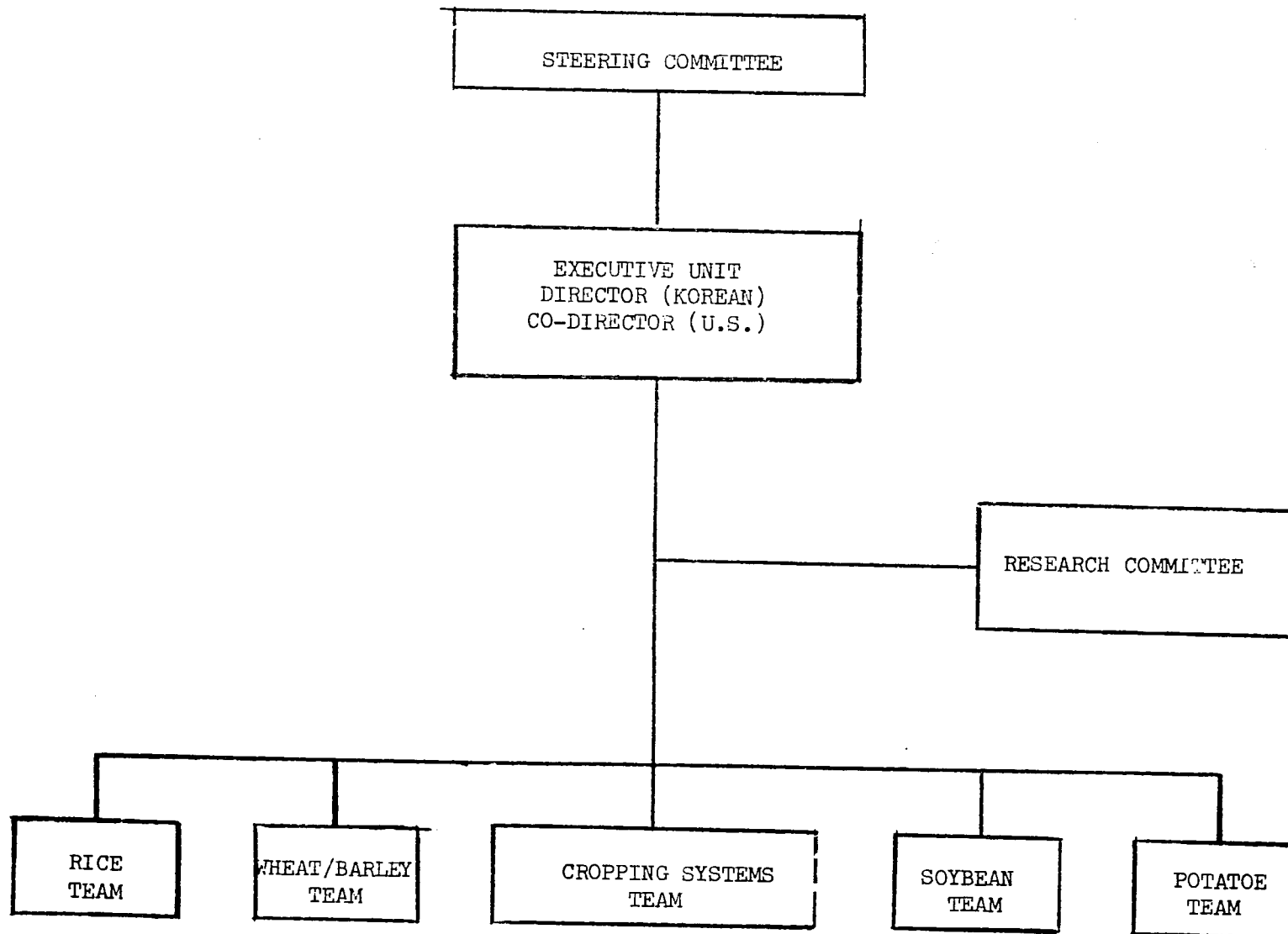
Administrator, ORD (Chairman)
 Director, Executive Unit
 Co-Director, Executive Unit (Secretary)
 Dean, College of Agriculture, Seoul National University
 Director, Research Bureau, ORD
 Representative of MAF
 Representative of Ministry of Education (MOE)

c. Executive Unit

The Executive Unit will be composed of a Korean Director and an American Co-Director. In order that the greatest possible technical expertise may be brought to bear on the 5-year objectives of the program, the Co-Director, in accordance with policies approved by the Steering Committee and in close consultation with the Director, will initially have the following specific authority and responsibilities:

(1) Administration and direction of the crop improvement programs;

PROJECT ORGANIZATION CHART



(2) Management of A.I.D. loan funds and the additional won funds to be made available for the project (disbursement of won funds and requests for commitment of A.I.D. loan proceeds will be made by the regular ORD financial section upon joint authorization of the Project Director and Co-Director);

(3) Final approval of training programs and the selection of technically qualified trainees;

(4) Making such arrangements of foreign and Korean personnel constituting the five multidisciplinary teams, as is considered most appropriate to accomplish project objectives;

(5) Performing staff functions for the Steering Committee;

(6) Serving as a member and Secretary of the Steering Committee;

(7) Final approval of commodities and equipment to be purchased for the project; and

(8) Negotiating and administering the contemplated contracts with COA/SNU, and others.

d. Research Committee

This committee will be composed of the Director of the CES, the Head of the Agronomy Department, COA/SNU, the Director of IAS, the Project Director, the Project Co-Director (as Chairman), and the leaders of the five multidisciplinary crop improvement teams. It will have the following responsibilities:

(1) Review research proposals;

(2) Monitor and review progress of the programs;

(3) Assure coordination among the teams;

(4) Identify gaps and needed adjustments in the program structure and implementation;

(5) Establish publication, communication and information procedures;

(6) Receive and screen nominations of Korean personnel for training;

(7) Approve the release of varieties, for purposes of seed multiplication, certification and distribution, jointly with representatives of the Rural Guidance Services and the National Seed Multiplication Program); and

(8) Assist the Executive Unit with establishing budgetary priorities.

e. Multidisciplinary Research Teams

Under the Executive Unit, multidisciplinary research teams will be established for rice, wheat/barley, soybeans, potatoes and multiple cropping systems. While the composition of the teams will be finally determined by the Co-Director in consultation with the Director and team leaders, their tentative composition is described below.

It is fundamental that each of the five projects be operated as a single national-research and training activity. The work will be planned and conducted by the respective research teams and administered by the Co-Director with the counsel of the Research Committee and in accordance with the policies approved by the Steering Committee. The work in all the ORD divisions falling within the parameters of this project will be within the jurisdiction of the project leadership, and the resources of each division supporting the work will be consigned to its conduct. This will not include the less directly related work already supported by the divisions, e.g., testing of pesticides and herbicides.

(1) Rice Team -- This team will be composed of a breeder, physiologist, entomologist, plant pathologist, bio-chemist and cultural-oriented agronomists. Since rice is the major cereal crop in Korea, the Executive Unit should give special emphasis to the development of a multidisciplinary team that includes the best research talent available in the country. International advisors such as a biometrician, physiologist, plant pathologist, breeding specialist, and economist, will be provided to the rice team.

(2) Barley and Wheat Team -- This team will be composed of staff from the Upland Crops Division, CES/ORD, a foreign barley breeder and a foreign wheat breeder, plus part-time assistance from the advisors in entomology, agricultural engineering, economics, statistics, bio-chemistry, and staff from the IAS divisions of soils chemistry, plant pathology and pest control. Representatives from COA/SNU should also be considered for inclusion in the team.

(3) Soybean Team -- This team will be composed of staff from the Upland Crops Division, CES/ORD, an international soybean breeder, part-time assistance from the advisors in entomology, bio-chemistry, plant pathology, biometrics, and members of the various related divisions of IAS. A member of COA/SNU, because of special interest in soybean breeding, will be invited to serve on the team. This team will also give immediate attention to improving cultural practices and dissemination of this information to the farmers.

(4) Potato Team -- The majority of this team will be Korean researchers from the Alpine Experiment Station and IAS, plus contract assistance from several colleges of agriculture. One foreign agronomist with training in potato cultural practices and who is knowledgeable in breeding programs throughout the world will

be employed for the equivalent of 3 months/year for four years. Also, a plant pathologist and entomologist and perhaps other advisors will assist as the need dictates.

(5) Cropping Systems Team -- Agricultural development in Korea should give a high priority to land saving technology, i.e., multiple cropping and yield increases. Although labor is becoming scarcer, it is still abundant relative to land; thus, the problem is one of maximizing production with given amounts of land and labor. Many observers cite the forage production potential of winter paddy and other crop combinations. With known crop varieties and combinations of crops grown under different cultural practices, there exists a potentially large number of production systems and commensurate farm profit levels. As new varieties of grain become available and the profitability of forage production becomes apparent, the most productive and profitable combination of crops and cultural practices could change considerably.

The general purpose of the Cropping System Team will be to (1) carry out research of an "agronomic experimental" nature to see what combinations of crops can be grown under experimental conditions and under farm conditions, and (2) determine the costs and returns under various cropping systems, including projections of costs and returns of possible production systems under different hypothetical cost and price structures. The following list contains some of the types of cropping system combinations which should be explored:

Forage - Rice	Barley - Soybeans
Forage - Barley	Wheat - Summer forage
Winter Forage - Soybean	Wheat - Soybeans
Rice - Barley	Wheat & Vetch - Rice
Rice - Wheat	

The cropping system team will carry out its research in several ways, such as:

- (i) Direct operations of its own experimental plots and farmer's field trials;
- (ii) Contracts with cooperators such as colleges or other research institutes; and
- (iii) Analysis of secondary data and of simulated situations.

The personnel requirements for this new unit in the Crops Experiment Station would be as follows:

<u>Team Leader</u>	- Agronomist
<u>Agricultural Economists</u>	- Farm Management, Cost Accounting, Data Analysis
<u>Agricultural Engineer</u>	- Soils Treatment and Water Management
<u>Agricultural Engineer</u>	- Mechanization, Tillage, Harvesting, Forage Processing

Other scientific consultative services from IAS, COA/SNU, etc., as required for analysis of crop combination recommendations.

Research Assistants

Time and Motion Clerks
Contract Research Supervisors
Data Analysts

3. Function of Colleges of Agriculture (other than COA/SNU)

In order to mobilize the most available trained manpower (75% of trained agriculturalists) in the country, a special Presidential Decree, aimed at the promotion of coordination among ORD and college staff members, was approved December 28, 1971. Under the decree, staff at ORD and professors at the colleges are entitled to hold concurrent positions at both ORD and a college. Several professors are already involved in this program and hold such joint appointments. This cooperation and coordination will be continued to support the crops improvement program, although the specific research tasks to be carried out at the colleges will not be determined until details of the project's research program have been fully developed.

4. International Cooperation

a. International Rice Research Institute (IRRI)

IRRI has been cooperating with ORD and COA/SNU in the field of rice research since 1965. A major achievement of this cooperation was the development of the "Tongil" variety (IR667).

Cooperation between ORD, COA and IRRI has been of three main categories: (1) consultation visits to Korea by top scientists in rice research, (2) training of Korean research workers, and (3) mutual exchange of breeding materials and information. Annually, three to four IRRI scientists have visited Korea, and four to five Korean workers have been trained at IRRI for a period of several months to one year.

Obviously, a continued relationship between IRRI and the Korean Crops Improvement Research Project is both desirable and natural. During a recent visit of IRRI officials to ORD, exploratory talks were held and a keen interest in a continued relationship was expressed by both parties; further discussions will certainly take place.

b. International Wheat and Maize Improvement Center (CIMMYT)

The International Wheat and Maize Improvement Center has sent representatives to Korea to discuss such areas of mutual interest as barley and wheat breeding, training Korean research workers, and cooperation in breeding research, including the exchange

of breeding materials. Two Korean research workers have already completed an on-the-job nine month training period at CIMMYT, and two more persons are now undergoing training. It is expected that other researchers will be sent to CIMMYT for either training and/or consultations. In addition, six nursery research programs in wheat are being conducted by ORD in a close cooperation with CIMMYT.

The proposed Project will definitely include an expansion of cooperation with CIMMYT, in order to develop more superior early-maturing wheat and barley varieties as soon as possible.

c. Additional Cooperation Contemplated

Inasmuch as the proposed Project will involve a major level of effort on soybeans, which has not previously received significant research attention in Korea, it is obvious that the Project research teams will need to avail themselves of data, genetic material and expertise available from institutions conducting on this crop. Ties will be sought with universities (e.g., Illinois) and other appropriate institutions for this purpose.

IV. Project Requirements

A. Resources and Activities

The existing facilities, research personnel and financial support available to ORD (including the rice research team of COA) constitute, in the aggregate, a resource base capable of making meaningful contributions to Korean agriculture, as has been demonstrated. However, in order for significant progress to be made in the target areas of improved varieties and cropping systems, the existing resource base must be provided the wherewithal to focus on the identified top research priorities and pursue a concentrated, properly designed and administered research effort leading to the achievement of the stated goals. Specifically, the upgrading of the capability of the research staff through new training programs, securing outstanding experienced researchers in crop improvement, importing the proper genetic material, acquiring certain specialized equipment, and the use of the international research centers to the fullest advantage are required to successfully carry out the project.

1. Executive Unit Personnel.

The success and progress of the total proposed program depends greatly on the administrative and scientific orientation of the Project Co-Director. Equally important is the Korean Director, who serves on a full-time basis and who, with the Co-Director constitutes the executive unit for the total Project, and who could well be expected to take full operational leadership of the Project at an appropriate time. Both positions call for highly qualified individuals who can effectively engage in program planning, decision making, daily operations, recruitment, etc. In addition, these positions call for administrative experience, research background international training and/or international research experience.

2. International Research Advisory Staff.

The key to the successful genetic improvement for increased yields of rice, barley, wheat, soybeans and potatoes depends chiefly upon the skills, experience and knowledge of the members that make up the multi-disciplinary research teams established for each crop. Trained, experienced researchers are also essential for improvement in cultural practices and the more efficient use of available land resources for the several crops. In relationship to the number of research staff needed, ORD has a reasonable staffing pattern, but there is a serious lack of staff members with graduate research training for the various crop research units. The rice team presently operating in COA/SNU provides an exception to this. To insure efficiency and rapid progress toward the objectives of the crop improvement program a number of international consultants will be employed to provide the expertise and training required to assist and build a research group that will achieve the desired goals. Table 1 tentatively identifies the professional disciplines that need to be provided by international advisors, the man-months needed by year, estimated yearly costs and the total five year costs. These requirements will, of course, be subject to final review by the Project Co-Director. During the first year the advisors will be generally limited to the crop breeders and the Co-Director as they will be the key individuals, along with the Korean counterparts, in the initial development of research

TABLE 1
International Scientists Requirement (by Year and Discipline)

International Advisors		Total	Year					Total cost	
		Number	Man/Months	1st	2nd	3rd	4th	5th	Dollars x 1000
A. Long Term									
Co-Director	1	60	12	12	12	12	12		250
Biometrician	1	48	-	12	12	12	12		160
Barley/Wheat Breeder	1	54	6	12	12	12	12		180
Rice Breeder	1	54	6	12	12	12	12		180
Soybean Breeder	1	54	6	12	12	12	12		180
Plant Physiologist	1	42	6	12	12	12	12		180
Plant Pathologist	1	48	-	12	12	12	-		140
Entomologist	1	48	-	12	12	12	12		160
Agr. Engineer	1	36	-	12	12	12	12		160
Agronomist (general)	1	54	6	12	12	12	-		120
Agronomist (crop syst.)	1	54	6	12	12	12	12		180
				12	12	12	12		180
B. Short Term									
Agronomist (Potatoes)	1	12	3	3	3	3	-		40
Agr. Economist	1	24	-	6	6	6	6		80
Plant Physiologist	1	18	-	-	6	6	6		60
Bio-Chemist	1	21	3	6	6	6	-		70
Soil Scientist	1	21	3	6	6	6	-		70
Food Technologist	<u>1</u>	<u>12</u>	<u>-</u>	<u>-</u>	<u>6</u>	<u>6</u>	<u>-</u>		<u>40</u>
Total	17	660	57	153	165	165	120		\$2,250

programs and establishment of operating procedures.

3. Counterparts, Program Assistants and other Staff Members of the Research Teams or Support Staff.

In addition to the expatriate scientists to be financed under the A.I.D. loan, the multidisciplinary research teams will be developed from the regular research staff of the several research units of ORD presently engaged in crop improvement work, plus people handling general management assignments, and the employment of temporary support personnel. Included would be Korean team leaders, or counterparts, statisticians, program assistants, secretaries, drivers and clerks. It is anticipated that a large number of temporary staff will also be employed to handle the total program. Approximately 86 persons will be needed for the newly created positions to supplement the 155 staff members presently assigned to crop improvement work at ORD. The staff members provisionally to be recruited, by field and year, are presented in Table 2. Special emphasis will be placed on the recruitment of Koreans who are presently studying overseas in appropriate fields and who expect to receive advanced degrees. Recruitment will also take place among recent graduates from Korean Universities. The contracting of personnel now holding faculty positions in the several Korean universities and colleges for high level assignments seems quite appropriate for the National effort of increasing food production.

In an effort to recruit and retain highly qualified temporary staff for the crop improvement program, and in accordance with salary determinations made under other operating international programs (e.g. UNDP), persons temporarily employed will be paid a salary 50% higher than the salary normally paid for that position. This seems to be a reasonable approach since temporary staff are not subject to the job benefits of the regular employees after termination of the five year program. During the life of the program every effort will be made, through government channels, to provide additional permanent positions with higher rank in order that competent, well-trained staff members capable of long-term crop improvement research can be retained by ORD.

4. Training

One of the serious problems confronting ORD, at the present time and for the future, is the general lack of highly trained research manpower. To assist in alleviating this deficiency, a high priority will be given to training programs, abroad and in-country, short-term and long-term.

(a) International Training - In the crops improvement area at ORD, the estimated needs for training abroad fall into three categories: (i) M.S. and Ph.D. degree programs, (ii) non-degree training at research units such as IRRI and CIMMYT, and (iii) refresher courses for senior scientists whose professional training was completed some eight or more years ago. Also, a limited number of COA/SNU faculty members will be included among

TABLE 2
Recruitment Program (by field and year)

Field	Number of Present staff	Planned Recruitment					Total
		'74	'75	'76	'77	'78	
Headquarters	138	22	22	14	14	14	86
Total	4	8	8	-	-	-	16
In Country	-	8	8	-	-	-	16
Overseas	-	-	-	-	-	-	-
Rice	36	4	4	4	4	4	20
Total	-	2	2	2	2	2	10
In Country	-	2	2	2	2	2	10
Overseas	-	-	-	-	-	-	-
Wheat & barley	12	4	4	4	4	4	20
Total	-	2	2	2	2	2	10
In Country	-	2	2	2	2	2	10
Overseas	-	-	-	-	-	-	-
Soybeans	5	2	2	2	2	2	10
Total	-	1	1	1	1	1	5
In Country	-	1	1	1	1	1	5
Overseas	-	-	-	-	-	-	-
Potatoes	5	1	1	1	-	-	3
Total	-	-	1	-	-	-	1
In Country	-	1	-	1	-	-	2
Overseas	-	-	-	-	-	-	-
Plant pathology & entomology	13	1	1	-	-	-	2
Total	-	-	-	-	-	-	1
In Country	-	1	-	-	-	-	1
Overseas	-	-	-	-	-	-	-
Multiple cropping	63	2	2	3	4	4	15
Total	-	1	1	2	2	2	8
In Country	-	1	1	1	2	2	7
Overseas	-	-	-	-	-	-	-

those selected for graduate education at the Ph.D. level, and for refresher courses.

A preliminary list of the needed training by disciplines, by year, and by months of training are shown in Table 3.

(b) In-Country Training - The estimated needs for in-country university training and general in-country training of ORD employees who are working or will work on ORD crop improvement program are presented in Table 4. The cost of approximately one million won per student covers a two year scholarship for M.S. and/or Ph.D. candidates, plus 200,000 won to be made available to the university department doing the training to insure that the student has available adequate laboratory materials and equipment, books, etc., for the graduate study. All Ph.D. positions listed are also included in Table 4 for one year of international non-degree work to supplement the COA training in areas of laboratory experience, library work and certain course work. This type of training seems desirable only until more satisfactory teaching-research laboratories and much improved libraries are available at the Korean colleges of agriculture.

The anticipated in-country training for crop improvement is more general in nature but of considerable importance to the progress of the total effort. The participants will continue as full time researchers but, through short courses, seminars, etc., will gain an appreciation and greater knowledge of improved research methodology. The teaching staff for these in-country programs are expected to be faculty members of Korean universities and possibly members of the international advisory staff.

5. Reference Material

Throughout the world the depository of knowledge in libraries has proven to be of utmost importance in any educational or research endeavor. In the agricultural complex at Suwon (including ORD and COA/SNU) the library facilities are not adequate for the heavy agricultural educational and research responsibilities of the two units, particularly with respect to the plant science and crop improvement fields. To insure that ORD researchers and the international advisors have an adequate reference source, proceeds of the proposed A.I.D. loan will be used to purchase new reference books, journals not now on hand, replacement of missing journal volumes, training films, color slide sets and other visual aid materials. Some AID loan funds will be made available to COA/SNU to upgrade the crop improvement section of its library. An updated and modern library will provide the opportunity for self-improvement of research and guidance personnel, provide the latest research findings around the world in plant science and should prevent duplication of effort in research if a given answer has been found and published by other

TABLE 3
International Training in Crops Improvement

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total No.</u>	<u>Total Man/Mos.</u>
Crops Breeding							
M.S.	1	1	1	1		4	96
Ph.D.	1*	1				2	72
Non-degree	1	1	1	1	1	5	60
Plant Pathology							
M.S.	1	1				2	48
Ph.D.	1	1*				2	72
Non-degree	1	1	1	1	1	5	48
Entomology							
M.S.	1	1				2	48
Ph.D.	1*	1				2	72
Non-degree	1	1	1	1		4	48
Bio-Chem. & Soils							
M.S.	1					1	24
Ph.D.	1					1	36
Non-degree	1	1	1	1		4	48
Agronomy							
M.S.	1	1				2	48
Ph.D.	1	1*				2	72
Non-degree	1	1	1	1	1	5	60
Plant Physiology							
M.S.	1		1			2	48
Ph.D.	1*	1				2	72
Non-degree	1	1	1	1	1	5	48
Agr. Engineering							
M.S.	1		1			2	48
Ph.D.	1*					1	36
Non-degree		1	1			2	24
Agr. Economics							
M.S.	1					1	24
Ph.D.	1*					1	36
Non-degree	1	1				2	24
Statistian							
M.S.	1					1	24
Librarian							
M.S.	1	1*				2	48

*Training for COA/SNU

Refresher Course -							
faculty & Sa. staff	4	4*	4	4*		16	96
Conferences	5	5	5	5	5	25	-
Total - M.S.						19	
Ph.D.						13	
Non-degree						32	
Refresher C.						16	
Conferences						25	

*Training for COA/SNU

TABLE 4
In-Country Training in Crops Improvement

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total No.</u>	<u>Total Man/Mos.</u>	<u>Total Cost x Million Won</u>
Crops Breeding								
M.S.	1	2	1	2	-	6	144	6
*Ph.D.	1	1				2	72	2
Plant Pathology								
M.S.	1	1	1	1	-	4	96	4
Ph.D.	1	1				2	72	2
Entomology								
M.S.	1	1	1	-	-	3	72	3
Ph.D.	1					1	36	1
Bio-Chem. & Soils								
M.S.	1	2	1	1	-	5	120	5
Ph.D.	1	1	1			3	108	3
Agronomy								
M.S.	1	2	1	1		5	120	5
Ph.D.	1					1	36	1
Agr. Engineering								
M.S.	1	1	1	1		4	96	4
Ph.D.	1					1	36	1
Agr. Economics								
M.S.	1	1	1			3	72	3
Ph.D.	1					1	36	1
Plant Physical								
M.S.	1	2	1	1		5	120	5
Ph.D.	1	1				2	72	2
Inservice Training								
Language	30	30	30	-		90	270	2.7
Exp. Design		20	20	20	20	80	240	2.4
Communication		20		20		40	40	.4
Pest Control			30		30	60	60	.6
Computer Sci.		20		20		40	120	1.2
Care of Equip.	30		30		30	90	90	.9
Res. Mgt.		20		10		30	30	3.0
Other	30	30	30	30	30	150	150	1.5
Total - M.S.	8	12	8	7	0	35	838	35
Ph.D.	7	4	1	0	0	12	432	12
Inservice	90	130	140	100	110	570	980	12

All Ph.D. - one/yr's. study in U.S.

agricultural researchers throughout the world.

6. Research Equipment

In addition to international advisors, training and reference material, the fourth major item required for an effective research effort in the plant science and crop improvement area is modern, functional research equipment. Generally, as mentioned earlier, ORD is reasonably well equipped for research activities but certain specialized equipment is required, a tentative list of which is given in Table 5.

B. Estimated Costs and Financial Plan

The combined foreign exchange and local currency costs of the Project are shown in Table 6. The amounts in Table 6 are expressed in terms of US dollars, the local currency amounts having been converted from won at the rate of US \$1.00 = W400.

Foreign exchange requirements of the Project amount to \$5.0 million, and will be financed directly from the proceeds of the \$5.0 million A.I.D. loan proposed herein. These requirements fall into the three general categories of Technical Assistance (i.e., foreign researchers), Training and Commodities (including equipment and scientific literature). The \$5.0 million loan will be allocated 46% to Technical Assistance, 24% to Training and 30% to Commodities. Table 7 presents a more detailed breakdown of the foreign exchange requirements.

The ROKG will finance all local currency requirements of the Project through increased budgetary allocations to ORD, as shown in Table 8. The amounts in Table 8 indicated as "Additive" are won equivalents of the local currency items in Table 6 (Total Project Costs).

The Project costs and financial plan presented in this section cover only the five years (1974-1978) for which A.I.D.'s direct financial assistance is sought. Beyond 1978, external financial assistance should not be required to carry on the program. It is planned and anticipated that by 1979 Korea's resource base for agricultural research, at least in the areas to be covered by this Project, will have been augmented to the extent that external inputs (e.g., foreign research scientists, equipment, materials, etc.) will no longer be required, except on an infrequent basis. This is not to say that the program of research in crops improvement will terminate once the proceeds of the A.I.D. loan have been expended. As stated earlier in this paper, the specific targets of the Project, i.e., the increased crop yields, should be reached within ten years (by 1983). Thus the ROKG will continue to finance and carry on the intensified crops improvement research effort, beyond the first five years, until the targets have been attained. The ROKG's commitment to maintain the research program at the same level of resources and quality of scientific input as are to be provided in total by the A.I.D. loan and the ROKG during the first five years, is stated in the official loan application.

TABLE 5
TENTATIVE EQUIPMENT LIST

	Units	Unit Cost (U.S. dollars)	Total
Sterilizer	1	5,000	5,000
Air conditioners - centralized labs.	6	500	3,000
Cold water tank	1	4,000	4,000
Mettler balance	5	1,000	5,000
Analytical balance	3	1,000	3,000
Torsion balance	10	500	5,000
Water stell	1	3,000	3,000
Thremster theormemeters	5	400	2,000
Hygrometers	6	500	3,000
Incubators	5	1,000	5,000
Water bath - Thermometers	10	500	5,000
Hydrometers	10	100	1,000
Baking quality testing set	1	7,500	7,500
Amino acid analyzer	1	25,000	25,000
Titlators	3	1,000	3,000
Oil extraction apparatus	3	500	1,500
Spectrophometers	1	3,000	3,000
Refrigerators	5	1,000	5,000
Muffle furnace	2	800	1,600
Ovens - drying	6	500	3,000
Grain dryer	2	2,000	4,000
Integrated processing units for threshing, hulling and sorting	2	7,650	15,300
Grain moisture meters	5	300	1,500
Small rice thresher	3	1,500	4,500
Fertility seed counters	2	2,000	4,000
Small milling tester	2	1,000	2,000
Head threshers	5	500	2,500
Nursery threshers	5	2,000	10,000
Microscopes	10	2,000	20,000
Microtones	2	1,500	3,000
Low temperature freezers	3	8,000	24,000
Auto area milers	2	2,000	4,000
A tormabsorp spectrophometer	1	3,000	3,000
Flam photometers	2	1,000	2,000
light meters	8	200	1,600
Liquid scintillation spec.	1	2,000	2,000
Magnetic stirrers	10	200	2,000
Calculators, electronic	5	2,000	10,000
Tractor plus accessories	4	20,000	80,000
Seed cleaner.	5	2,000	8,000
Power sprayers	6	1,000	6,000
Tillers	10	1,000	10,000
Microscope - phase c.	2	2,000	4,000
Freezer dryer	1	3,000	3,000
Centrifuge, high speed refreg.	1	6,000	6,000
Other small laboratory equipment			133,000
Deep freezers	5	1,000	5,000
Contract equipment for COA/SNU			175,000
Miscellaneous			40,000
	<u>Sub-Total</u>		<u>679,000</u>

Books, periodicals and other Educational and Audiovisual Aids (\$100,000 COA/SNU)	400,000
Supplies and Materials (\$42,000 COA/SNU)	412,000
<u>Total</u>	<u>\$1,491,000</u>

TABLE 6
TOTAL PROJECT COSTS
PROJECT YEARS

<u>Use of Funds</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total</u>
(All Amounts Expressed in US\$, 000 Omitted)						
I. Technical Assistance (foreign research scientists)						
Foreign Exchange (US\$)	200	520	560	560	410	2250
Local Currency (won)	<u>110</u>	<u>170</u>	<u>187</u>	<u>200</u>	<u>189</u>	<u>856</u>
Sub Total	310	690	747	760	599	3107
II. Operations						
Foreign Exchange	-0-	-0-	-0-	-0-	-0-	-0-
Local Currency	<u>37</u>	<u>38</u>	<u>38</u>	<u>38</u>	<u>37</u>	<u>188</u>
Sub Total	37	38	38	38	37	188
III. Training						
Foreign Exchange	263	358	273.5	159	45.5	1099
Local Currency	<u>210</u>	<u>200</u>	<u>200</u>	<u>200</u>	<u>190</u>	<u>1000</u>
Sub Total	473	558	473.5	359	235.5	2099
IV. Facilities, Equipment & Commodities						
Foreign Exchange	208	488	378	270	187	1491
Local Currency	<u>150</u>	<u>105</u>	<u>75</u>	<u>85</u>	<u>77.5</u>	<u>492.5</u>
Sub Total	358	593	453	355	264.5	1983.5
V. Contract Research Services						
Foreign Exchange	-0-	-0-	-0-	-0-	-0-	-0-
Local Currency	<u>50</u>	<u>50</u>	<u>50</u>	<u>50</u>	<u>50</u>	<u>250</u>
Sub Total	50	50	50	50	50	250
VI. Regional Cooperation						
Foreign Exchange	-0-	-0-	-0-	-0-	-0-	-0-
Local Currency	<u>67.5</u>	<u>67.5</u>	<u>67.5</u>	<u>67.5</u>	<u>67.5</u>	<u>337.5</u>
Sub Total	67.5	67.5	67.5	67.5	67.5	337.5
VII. Miscellaneous (international travel, evaluators, consultants)						
Foreign Exchange	32	32	32	32	32	160
Local Currency	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>
Sub Total	32	32	32	32	32	160

TOTALS						
Foreign Exchange	703.0	1358.0	1243.5	1021.0	674.5	5000.0
Local Currency	<u>524.5</u>	<u>630.5</u>	<u>617.5</u>	<u>640.5</u>	<u>611.0</u>	<u>3124.0</u>
GRAND TOTAL	<u>1327.5</u>	<u>1988.5</u>	<u>1861.0</u>	<u>1761.5</u>	<u>1285.5</u>	<u>8125.0</u>

TABLE 7
Summary of Dollar Budget for Crop Improvement - ORD

<u>x 1000 Dollars</u>						
	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>Total</u>
I. Professional Advisors						
1. Long term	170	450	450	450	370	1,890
2. Short term	<u>30</u>	<u>70</u>	<u>110</u>	<u>110</u>	<u>40</u>	<u>360</u>
Sub-total	200	520	560	560	410	2,250
II. International Training						
1. M.S. degrees	95	142.5	76	38	9.5	361
2. Ph.D. degrees	76	123.5	123.5	47	--	370
3. Non-degree	70	70	52	52	34	278
4. Refresher course	20	20	20	20	--	80
5. Conference	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>10</u>
Sub-total	263	358	273.5	159	45.5	1,099
III. Books, journals, films, visual-aid's	50	75	100	100	75	400
IV. Research equipment	100	260	165	85	69	679
V. Supplies and materials	58	113	113	85	43	412
VI. Miscellaneous						
1. Travel-International	30	30	30	30	30	150
2. Consultants and evaluators	2	2	2	2	2	10
Sub-total	32	32	32	32	32	160
<u>Grand Total</u>	<u>703</u>	<u>1,358</u>	<u>1,243.5</u>	<u>1,021</u>	<u>674.5</u>	<u>5,000</u>

TABLE 8
Summary of Won Budget for Crop Improvement Project

		Unit: Million Won						
Item	Level	Year						Total
		'73	'74	'75	'76	'77	'78	
Salaries, Housing and Educational Allowance	Original	-	75	75	75	75	75	375
	Additive	-	44	68	75	80	76	343
	Sub-Total	-	119	143	150	155	151	718
Operations	Original	99	109	121	134	148	163	774
	Additive	-	15	15	15	15	15	75
	Sub-Total	99	124	136	149	163	178	849
Training	Original	184	244	270	298	329	362	1,687
	Additive	-	84	80	80	80	76	400
	Sub-Total	184	328	350	378	409	438	2,087
Facilities	Original	118	134	149	166	183	201	951
	Additive	-	60	42	30	34	31	197
	Sub-Total	118	194	191	196	217	232	1,148
Contract Research	Original	11	12	13	16	17	24	93
	Additive	-	20	20	20	20	20	100
	Sub-Total	11	32	33	36	37	44	193
Regional Cooperation	Original	40	53	61	67	73	82	376
	Additive	-	27	27	27	27	27	135
	Sub-Total	40	80	88	94	100	109	511
TOTAL	Original	452	627	689	756	825	907	4,256
	Additive	-	250	252	247	256	245	1,250
	Sub-Total	452	877	941	1,003	1,081	1,152	5,506

V. Project Implementation

A. Implementing Agency

ORD will have overall responsibility for implementing the Project; direct operational responsibility and authority will be exercised over the crop improvement programs and the program for cropping systems. Certain parts of the rice improvement program will be carried out by COA/SNU's existing rice research team under a contractual relationship with ORD.

B. Implementation Planning, and Role of Intermediaries

The selection of the Project Co-Director is the key first step in project implementation. This selection will be made by ORD in consultation with USAID and with the Project Director, who is expected to be named at a very early date. Next, ORD would begin negotiations with an intermediary organization (or organizations) which would be looked to for assistance primarily in such areas as recruiting and providing administrative support for foreign research scientists, and arranging training abroad for Korean scientists. Such an organization could be the Institute for International Education (IIE), an international research institute (e.g., IRRI), or a U.S. university. It is also possible that a prime-contractor/sub-contractor arrangement will be sought, with two or more intermediaries involved. Informal contact has been initiated with both IRRI and IIE to explore the possibilities, and indications at this time are that satisfactory arrangements will not be difficult to make. In this regard, it should be kept in mind that ORD has had relationships with both IRRI and CIMMYT for several years, which have proven to be quite beneficial.

Even while negotiations are underway between ORD and prospective intermediaries, the Project Director and Co-Director would begin selection and recruitment of team leaders and members. The capabilities of such entities as IIE for identifying and evaluating candidates in the various disciplines of agricultural research are not yet fully known to USAID or ORD. Thus, if IIE is the prime contractor, additional assistance from A.I.D. and/or other outside sources may be needed in the phase of implementation.

As research teams are formed, they will develop and refine work plans, establish specific equipment, commodity and technical literature needs. Dollar procurement will be carried out by the government's Office of Supply (OSROK), as will be a portion of the local procurement.

The research teams will also plan specific educational needs, identifying the candidates, the type and location of training. Arrangements for in-country training will be handled by ORD with assistance from COA/SNU. Responsibility for arranging training abroad (primarily the U.S.) remains to be fixed, but will depend to a large extent on the nature of, and with what entities, intermediary relationships established by ORD and the Project management.

C. Role of Existing Facilities and Entities

31

1. Role of the Crops Experiment Station (Suwon)

This central station occupies about 100 hectares of land, and has 16 greenhouses. Major emphasis at present is on the breeding of superior varieties of major food and feed crops, the development of industrial and export crops, the improvement of cultural techniques and development of more efficient cropping systems and intensive land utilization. There are two branch stations of the central station - one at Mokpo in the southern part of the country, engaged in varietal improvement and cultural practice research of oil and fiber crops, and one at Kanghwa, working with salinity problems of rice and farm mechanization. Also, two sub-stations are involved in special aspects of crop research - Cholwon, where work is being done on cold resistant rice varieties and cultural practices for higher elevation areas, Kwangju, where the main effort is to improve barley and wheat and to seek better cultural technology.

Under the loan program most of the breeding work will be centered at the central experiment station operating through the research teams, and the outlying stations will have the duties of handling the field trial work.

2. Role of the Honam and Yongnam Experiment Stations

The breeding work which was in the past done in the outlying stations will be taken over by the research teams at the central station. In the field this shift in breeding work will provide more time and funds for larger field trials as new varieties are developed by the research teams and new cultural practices are devised for the new varieties. Also, greater emphasis can be placed on seed multiplication. In order to supply the research teams with sufficient personnel, some staff, chiefly breeders, may be transferred to the central station.

3. Role of the Livestock Experiment Station

Due primarily to the limited land resources of Korea, animal husbandry production has received less attention than production of grains and other food crops. Many researchers and agriculturalists are convinced that through maximum utilization of low-potential soils-like the hillside lands, and paddy land during the winter season for forage production, great progress can be made in increasing the amount and quality of animal protein foods. This station will contribute to the Project by becoming involved in the cropping systems portion of the research effort. Storage and utilization of forage is an important aspect of the overall program. The pasture improvement project in which the West Germans will be involved should contribute greatly through close coordination with the Project.

4. Role of the Institute of Agricultural Science

This Institute conducts research in the areas of chemicals, physical and physiological properties of soils, diagnosis and study of plant nutritional problems, development of new fertilizer mixtures, and development of improved plant protection measures through pathological and entomological studies.

IAS will supply the research teams with the best information available concerning Korean conditions, and will also supply research specialists in soils entomology and plant pathology to work as members of the multidisciplinary research teams. However, in order to avoid breaking up the respective science units, these specialists, while serving as members of the multidisciplinary teams, will remain associated with IAS.

5. Role of the College of Agriculture, Seoul National University

Presently twelve professors from COA/SNU are participating in the crop research (primarily rice) being conducted at the three crop experiment stations and at IAS, but due to a severe lack of adequate research facilities and funding and the time required for teaching, their contributions have been severely limited. With more funds, equipment and investment of research time, it is believed that the present COA/SNU research team can contribute greatly to the goals of the Project.

The COA/SNU rice research team is already a functioning unit consisting of a rice breeder, agronomist, biochemist, two plant pathologists, two entomologists and a plant physiologist. This team has under study several thousand lines of rice, the characteristics of which cover resistance to diseases and insects, cold tolerance, and other acceptable qualities. It appears that the best interest of the Project will be served by obtaining the services of the team under contract. The exact nature of the work to be carried out by the team will be determined as details of the total rice research program are finalized.

The COA/SNU staff will continue to consult with the ORD crops stations on all aspects of field trials, cultural practices, evaluation, experimental design, etc. Also, COA/SNU has the capacity to be of assistance to the research teams to be formed for barley, wheat, soybeans and cropping systems.

Probably most useful over a longer period of time for all agricultural development and especially in the crops area is the advanced training that can be offered at the M.S. and Ph.D. level. To do the best job of training needed for the future, efforts must be made to improve the college library, upgrade teaching/research laboratories and provide opportunities for students to receive some financial support while studying full time in the crop improvement areas. Highly trained manpower from in-country institutions is the key to successful agricultural development in any country and, in the longrun, should receive the highest priority when dealing with crop improvement or any other endeavor. The faculty of COA/SNU, which has a large number of foreign trained Ph.Ds will be used for in-service training of ORD staff working in the crops improvement Project.

D. Financial Management

General financial planning and management of the proceeds of

the proposed A.I.D. loan, and of the incremental local currency resources to be made available by the ROKG, will be exercised by ORD's existing Financial Section in accordance with regulations and procedures established by EPB under and for international loan operations. The Project Co-Director will have the primary responsibility for preparing working budgets utilizing both funding sources (foreign exchange and local currency), to cover all Project activities, including contract arrangements, salaries and allowances of foreign advisors, equipment and material procurement, and arrangements for international training of Korean research personnel. Disbursement of won funds and requests to A.I.D. for the commitment and/or disbursement of loan proceeds will also be handled by the Financial Section, upon joint authorization by the Project Director and Co-Director.

ORD's regular budgetary resources for the crop improvement activities included in the Project - which do not include the additional ROKG input of approximately \$625,000 (equivalent) per year to fund the Project's local currency costs - will be managed according to ORD's established procedures, except that the Executive Unit of the Project will be kept fully informed of all pertinent matters.

VI. Project Evaluation

A. General

Over the years, ORD has developed procedures and techniques of evaluating its various programs, and requires that all its programs - including research - be evaluated on a regular basis. This requirement, and the essential aspects of their evaluation system are stated in ORD's Official Regulations. ORD feels that this evaluation system is tested and adequate, and can be applied - with certain modifications - to be proposed crop and cropping systems improvement project. The Project Steering Committee, which will have the overall responsibility of evaluation, will review ORD's existing evaluation system and make whatever modifications it considers necessary for adaptation to the Project.

B. Synopsis of ORD Evaluation System

ORD's system is structured around the concept that evaluation must occur at certain key points throughout the life of the project or the activity being evaluated. There are three basic phases:

- (1) Pre-Evaluation, before the project enters the implementation stage;
- (2) Interim Evaluation, at an appropriate frequency during the implementation of the project; and (3) Post Evaluation, upon completion of the project, or a major phase thereof.

With respect to the proposed Crops Improvement Research Project, the Pre-Evaluation phase will consist of a two-part review of (1) the overall purpose, long-range targets, and general direction of the Project, and (2) the method of approach and design of the Project, to include detailed program planning (scope, organization, staffing, funding, locus of activities, experimental methodology, etc.) and expected utility of research results. It is important to note

that any recommendations resulting from an evaluation of basic policies and research plans will be in the form of recommendations only; the final authority and responsibility for carrying out this Project rests with the Steering Committee, and the Executive Unit. The Pre-Evaluation Phase will be performed by a general Evaluation Committee, made up of qualified individuals invited mostly from government and the academic community, both within Korea and abroad (to include the international research centers). Timing of the Pre-Evaluation will obviously depend on preparation of detailed Project plans prepared by the individual team leaders; tentatively, this will take place by mid-1974.

Interim Evaluation will take place at least once within a year after the actual research activity has begun, and at least once each year thereafter. A separate standing committee will be formed to conduct the interim evaluation of each of the five research sub-projects. These standing committees would be available for consultation and/or to conduct ad hoc evaluations - in addition to the regularly scheduled interim evaluations - should the need arise. The purpose of Interim Evaluation will be to assess the progress of the research effort toward achieving the established targets. Recommendations may be made to continue the particular research plan, modify the plan to correct a deficiency, or alter the degree of emphasis on an aspect of the breeding experiments, or to abandon the plan and design a new one.

Post Evaluation will, of course, be conducted upon completion of the A.I.D.-financed portion of the research Project. Assessment will be made of the degree of success attained in reaching the specific research targets, and of the scientific, technical and economic value of the research results. Recommendations will be made concerning the dissemination of research results, and the continuing research effort needed if targets have not yet been reached.

In addition to the formal evaluation described above, the element of continuous self-evaluation on the part of the Project's management and staff should not be overlooked. As with most undertakings of this nature, being carried out by competent and dedicated professionals, evaluation is an integral part of every day's efforts; there is no reason to believe the proposed Project will be an exception.

VII. Utilization of Research Results

A. Dissemination to Farmers

The responsibility of transferring information concerning the results of research programs to farmers and of educating farmers in the proper methods of utilizing research output, is that of the Guidance Bureau of ORD. The findings of research, results of demonstrations and field trials concerning new crop varieties, usage of fertilizers, pesticides and new cultural practices are of limited if any value to the farmer unless the right information is made available to him on a timely and understandable basis.

Through past performance, the Guidance Bureau has demonstrated the ability to perform this function in a more than adequate manner. A notable example of the Guidance Bureau's capacity was their performance in disseminating information to farmers concerning planting and cultivation of IR667 in 1972, the first year in which that newly-developed variety was planted extensively. Considering the success of IR667 last year, the Guidance Bureau's performance was creditable by any standard. Similar experiences have occurred in the case of the rapidly developing mushroom industry, livestock feeding, and fruit and vegetable development.

A rural guidance (i.e., extension) service was first established under ORD in 1957 and, in 1962, various other functions including community development, rural youth programs were combined with guidance for better efficiency and administration. There are now more than six thousand Rural Guidance Workers in the provinces, using every means at their disposal to transmit information to farmers. Demonstrations are the most important guidance teaching devices; other methods include farmers' meetings, farm visits, office contacts, publications, films, etc.

The foregoing is not to say that the guidance service lacks room for improvement. Insufficient budgetary resources result in inadequate equipment, facilities, and educational media. Low salaries contribute to a fairly high and increasing rate of turnover, and force ORD to resort to hiring inadequately educated guidance workers, e.g., high school graduates instead of college graduates. Also, as a result of the strong role played by the Central Government, guidance workers often tend to become advocates of particular government policies, more than educators of farmers. ORD recognizes these deficiencies and is exploring methods of improvement.

On balance, however, it would appear that ORD's Rural Guidance Bureau is entirely capable of disseminating the results of the proposed research effort, thereby making it possible for farmers in Korea - to realize the benefits of the research program.

B. Seed Processing and Distribution

A sound, national program of crop improvement leading to increased production depends, to a great extent, upon an internal capacity to provide a dependable supply of high quality seeds available to farmers at a reasonable cost. Thus, the overall requirement is for a seed processing and distribution program supported by a level of research effort which will provide a fairly constant stream of well-tested crop varieties.

To meet the seed processing and distribution requirement, the ROKG has applied to the IBRD for a loan of \$6.8 million to assist in financing a project designed to result in the establishment of a modern seeds industry in Korea. Specifically, the project would include:

1. Construction and installation of five facilities of approximately 3,500 tons capacity each for processing and storing field crop seeds, and six such facilities of approximately 2,000 tons each for potato seeds;

2. Incremental operating capital for the above facilities (to be furnished by the ROKG as part of their local currency contribution to the project);

3. Seed testing laboratories and equipment for quality control; and

4. Technical assistance and training.

Overall guidance and coordination of the project will be the responsibility of MAF, with the National Seeds Council having the responsibility to operate the production, processing and storage facilities and to distribute the seeds. Quality control and inspection will be provided by the ROKG's National Agricultural Products Inspection Office, which is responsible for the inspection and regulation of quality control for all agricultural products that pass through domestic and export market channels.

The total cost of the activity to be assisted by IBRD financing is estimated to be \$13.5 million, in foreign exchange and local currency, and will be financed approximately 50% each by the IBRD and the ROKG.

Throughout the planning stages of both this IBRD loan and the A.I.D. research loan proposed herein, there has been close coordination and consultation among the staffs of the two lending institutions and the appropriate ROKG agencies. The IBRD, ROKG and A.I.D. view the seeds project and the research project as being highly complementary, and a "condition of effectiveness" of the IBRD loan is that arrangements acceptable to IBRD will be completed with A.I.D. for the financing of additional crops research under ORD. It has been informally communicated that authorization and signing of the proposed A.I.D. loan would be considered acceptable arrangements.

VIII. Economic Considerations

A. Benefits of the Project

The specific targets of the proposed research program, expressed in terms of higher yields of basic crops, were stated in Section III.A of this paper. If these targets are reached, the benefits to Korea's economy, and particularly the agricultural sector, will be substantial. The following table shows the projection to 1982 of selected performance variables. The table compares (1) what is expected if the present pace of varietal improvement and present land utilization trends are continued, with (2) what may be expected if the research targets are attained and full utilization made of the results.

<u>Estimate of Partial Impact of Program</u>		
<u>Performance Variable</u>	<u>Present Trends</u>	<u>Targets Attained</u>
Total Agricultural Value Added (billions of Won)	771	901
Per Capita Agr. Value Added (thousands of Won)	58.9	68.8
Total Agricultural Income (billions of Won)	852	982
Per Capita Agr. Income (thousands of Won)	65.1	75.0
Foreign Exchange Used to Purchase Agricultural Products (billions of Won)	137.4	6.1
Rice Deficit (MT000) 1255	1255	104
Wheat Deficit (")	1391	1048
Barley Surplus (")	296	2015

Note: These projections were made utilizing the computer model of Korea's agricultural sector, developed as part of the previously-mentioned sector analysis performed by the Michigan State/AERI Team.

It should be kept in mind that the above table covers only selected performance variables, which are readily quantifiable. Such benefits as are expected from improving soybeans, forages and livestock/crop production systems are not included. Even so, the estimated benefits are substantial and widespread, and of such a magnitude - when compared to the cost of the Project - that the standard economic tests of cost-benefit ratio or internal rate of return are not considered necessary in order to justify the investment of resources required. Although the research targets used as a basis for the above projections are considered reasonable by Korean and foreign agriculturalists alike, it must be remembered that the figures are

judgmental and that errors in judgment would affect the estimated benefits outlined above. If, for example, the increased crop yields attained are only one-half those targeted, the total agricultural value added per year would still be increased by approximately 39 times the annual cost of mounting the program, as compared to approximately 162 times the annual cost if the targets are fully attained. In other words, even if there is a substantial margin of error in the projected crop yield increases, resulting in substantially decreased benefits as measured by the selected performance variables of the agriculture sector and the economy in general, the potential economic benefit of the Project is many times greater than the cost of the research effort per se.

In conformance with A.I.D.'s Policy Determination No. 48, dated October 2, 1972, the Project Committee has given consideration to the probable impact of the Project on employment and income distribution. Keeping in mind that:

- (a) the average farm size in Korea is 0.92 hectares and that 67.7 percent of farm households occupy farms of less than 1.00 hectares;
- (b) 91 percent of all farm households are engaged in the cultivation of rice and upland crops (barley, wheat and soybeans), and
- (c) one of the primary purposes of this research project is to increase production of such basic crops through higher-yielding varieties and greater land utilization,

then it is reasonable to expect that benefits of the research effort will be enjoyed by the vast majority of Korea's rural people in the form of higher income generated by increased production. Further, it is reasonable to expect that increased crop production will require additional labor, which could be supplied in the form of either fuller employment of existing rural labor or the creation of additional jobs.

B. Korea's Balance of Payments Position and Debt Service Capacity

In July 1973 the ROKG made public its revised economic projections for the period 1973-1981, which are based on achieving the ambitious targets of \$10 billion in exports and \$1,000 per capita GNP by 1981. Real GNP is expected to increase by 9% per annum in 1974-76, and by 11% per annum from 1977 through 1981. Manufacturing will grow most rapidly in investment and output, with heavy industry increasing from 35% to 51% of manufacturing output, and from 27% to 65% of manufactured exports during the period. Compared to an overall annual growth of 16% to 7% for manufacturing, agricultural output is projected to increase at about 4% to 5% annually.

These projected growth rates will, of course, have a significant impact on the country's Balance-of-Payments. Commodity exports are expected to grow at a compound rate of 28% through 1976, but will slow to 16% in 1977-81. Imports are expected to increase by 14.4%, through 1976, and 12.6% in 1977-81. Thus, Korea's net goods and services deficit is expected to remain in the \$650-800 million range through 1978, decline to \$260 million in 1980, and change to \$90 million surplus in 1981.

Total foreign savings required (1973-1981) is estimated to be \$5.05 billion, and gross foreign capital arrivals are estimated at \$10.0 billion, composed of \$1.6 billion in foreign investment, \$4.1 billion in

public loans and \$4.3 billion in commercial loans. Little decline is forecast in gross capital inflows through 1981, when arrivals will equal outflows of \$1.1 billion in debt service and profit remittances. Debt outstanding, however, is expected to increase less rapidly than exports, and the debt service ratio (for debt of three years and over) is estimated to decline from 14.4% to 7.6% of goods and services exports, 1972-1981.

Tables 9 and 10, following, present summaries of Korea's Balance-of-Payments and Debt Service positions.

Table 9

Balance of Payments
(in current prices)^{1/}

In million U.S. dollars

	1972	1973	1976	1981	1972-76	1977-81
I. Goods and Services	-520	-835	-660	90	-3,442	-2,147
1. Merchandise Exports	1,676	2,350	4,407	10,970	14,985	39,375
2. Merchandise Imports	2,254	3,104	4,798	10,289	17,695	39,111
Trade Balance	-578	-754	-391	681	-2,710	264
3. Invisible Receipts	565	599	852	1,628	3,398	6,528
4. Invisible Payments	507	680	1,121	2,219	4,110	8,939
Invisible Balance	58	-81	-269	-591	-712	-2,411
II. Transfer Payments (Net)	170	148	154	76	799	429
Current Account Balance	-350	-687	-506	166	-2,643	-1,718
III. Capital Transactions (Net)	489	789	638	369	3,265	3,209
5. Long-term Capital (Gross)	718	981	1,020	1,126	4,713	6,037
6. Amortization	-202	-242	-321	-498	-1,330	-2,080
7. Short-term Capital & Others (Net)	53	50	-61	-259	-98	-748
IV. Changes in Foreign Exchange Holdings	159	102	381 ^{2/}	149 ^{3/}	642	1,491
V. Foreign Exchange Holdings	694	796	1,177	2,668	4,620	9,501

^{1/} Assuming 3.5% dollar inflation beginning in 1973.

^{2/} Cumulative, 1974-76

^{3/} " , 1977-81

Table 10

Debt Service Payments and Ratios
(millions of dollars)

	<u>A1971</u>	<u>F1972</u>	<u>E1973</u>	<u>E1974</u>	<u>E1975</u>	<u>E1976</u>
A. Foreign Exchange Earnings						
1. Commodity Exports	<u>1,616</u>	<u>2,237</u>	<u>2,690</u>	<u>3,299</u>	<u>4,058</u>	<u>4,902</u>
2. Service Earnings	<u>1,132</u> 484	<u>1,676</u> 561	<u>2,148</u> 542	<u>2,730</u> 569	<u>3,413</u> 645	<u>4,186</u> 716
B. Principal Repayments	232	272	350	365	366	403
C. Interest Payments	<u>89</u>	<u>125</u>	<u>154</u>	<u>181</u>	<u>209</u>	<u>237</u>
D. Total Debt Service	321	397	504	546	575	640
E. (Of which 1-3 year debt)	(106)	(83)	(130)	(116)	(131)	(151)
F. Debt Service Ratio (D/A x 100)	19.9	17.7	18.7	16.6	14.2	13.1

A.I.D. Loan No.

AID-DLC _____

LOAN AUTHORIZATION

Provided from: Development Loan Funds

(Korea: Agricultural Research Project)

Pursuant to the authority vested in me as Assistant Administrator, Bureau for Asia, Agency For International Development (A.I.D.) by the Foreign Assistance Act of 1961, as amended, and the Delegations of Authority issued thereunder, I hereby authorize the establishment of a loan pursuant to Part I, Chapter 2, Title I, the Development Loan Fund, to the Government of the Republic of Korea (Borrower) of not to exceed Five Million Dollars (\$5,000,000) to be made available to assist in financing the foreign exchange costs of certain laboratory and other equipment, materials and suppliers, including scientific books and technical journals, and of technical assistance including training, required to implement a project of agricultural research in the Republic of Korea. The loan is to be subject to the following terms and conditions:

1. Interest Rate and Terms of Repayment

This loan shall be repaid by the Government of Korea within forty (40) years after the date of the first disbursement thereunder including a grace period of not to exceed ten (10) years from the date of the first disbursement. The interest on the unrepaid principal balance of the loan shall accrue from the date of the first disbursement at the rate of 2% per annum during

the grace period and at the rate of three percent (3%) per annum throughout the remaining life of the loan.

2. Currency of Repayment

Provision shall be made for repayment of the loan and payment of the interest in United States dollars.

3. Other Terms and Conditions

a. Unless A.I.D. agrees otherwise in writing, the project shall be carried out in general conformity with the project plan submitted as part of the application for this loan.

b. The agency responsible for implementing this project on behalf of the Borrower shall be the Office of Rural Development, operating under the Ministry of Agriculture and Fisheries.

c. Borrower shall provide all local currency and other resources required for punctual and effective implementation of the project.

d. Unless A.I.D. agrees otherwise in writing, equipment, materials and technical assistance financed under this loan shall have their source and origin in countries included in A.I.D. Geographic Code 941 (Selected Free World).

e. The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

Assistant Administrator for Asia

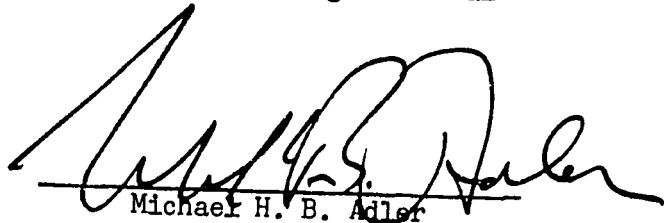
Date

AID-DLC/P- 2014
Annex B

November 27, 1973

CERTIFICATION PURSUANT TO SECTION 611(e) OF
THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Michael H. B. Adler, the principal officer of the Agency for International Development in Korea, having taken into account, among other things the maintenance and utilization of projects in Korea previously financed or assisted by the United States, do hereby certify that in my judgement Korea has both the financial capability and the human resources capability to effectively utilize the assistance to be provided under the Agricultural Research Project.


Michael H. B. Adler

12 Oct 1973
Date

STATUTORY CHECKLIST

I. COUNTRY PERFORMANCE

A. Progress Towards Country Goals

1. FAA 88201(b)(5), 201(b)(7), 201(b)(8), 208. Discuss the extent to which the country is:

(a) Making appropriate efforts to increase food production and improve means for food storage and distribution.

(a) From 1962 through 1971 the National Income accounts show that the value added in the agriculture sector increased by approximately 50% (an average growth of 5% per year or a growth rate of 4.2%). Significantly, this decade included the two drought years of 1967 and 1968; however, significant investments have been and are being made in irrigation facilities which will minimize future weather influences on production.

In the past two years, rice prices have been allowed to increase 29.3% substantially more than the 10.2% increase allowed in the previous three years. This increase will provide additional incentive for farmers to use fertilizer and other inputs required to increase production.

Under the proposed loan for agricultural research, substantial effort and expenditure will be made to develop and introduce new crop varieties. Under previous A.I.D. assistance, food storage capacity was improved and increased.

(b) Creating a favorable climate for foreign and domestic private enterprise and investment;

(b) Korea has taken a number of effective steps to create a favorable investment climate. A liberal foreign investment law was enacted, and intensive study is being undertaken by the ROKG of means of expanding capital markets. An investment center has been established, and domestic investment has been assisted by a number of A.I.D. loans such as the loan to the Korea Development Bank.

(c) Increasing the people's role in the developmental process;

(c) Koreans are basically a homogeneous people whose society is relatively free and politically stable. Korea does not possess deep sectional, religious or social cleavages. Korea's rapid economic development benefits increasingly larger segments of the population.

(d) Allocating expenditures to development rather than to unnecessary military purposes or intervention in other free countries' affairs;

(d) Korea has wisely allocated its resources in such a way as to maximize its economic development while maintaining sufficient military forces to insure a relative freedom from threatened external aggression. Korea is not intervening in other free and independent nations' affairs.

(e) Willing to contribute funds to the project or program;

(e) The ROKG will provide all local currency requirements of the project for the first five years, and all resources necessary for the continuation of the effort beyond that time.

(f) Making economic, social and political reforms such as tax collection improvements and changes in land tenure arrangement; and making progress toward respect for the role of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise;

(f) Korean land reform programs have eliminated the large landholding class and have created a large number of independent farmers who own their own small farms. The ROKG has assisted in the establishment of a number of farm and fishery cooperatives which have been of significant assistance to the independent farm and fishery communities.

Our Mission has also assisted the ROKG in its efforts to reform the equity of tax rates and collection procedures. These reforms have greatly increased both the amount of taxes collected and the equity with which the program is administered.

On October 17, 1972, the President of Korea declared martial law, giving as reasons domestic and international political developments. Under the martial law, political liberties were restricted and the Korean press was placed under tight control. A new constitution has since been adopted and martial law lifted on December 13, 1972, but restrictions on political activity and press freedom continue.

(g) Responding to the vital economic, political and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

(g) The ROKG has made significant progress in its efforts to provide a better life for the average Korean citizen. The Government has encouraged the rapid expansion of small and medium industry, stimulated the development of farmer credit unions and fishing cooperatives and has helped in many other ways to better the lot of its people.

B. Relations with the United States

1. FAA Sec. 620(c). Is the government indebted to any U.S. citizen for goods or services furnished or ordered where: (a) such citizen has exhausted available legal remedies, including arbitration, or (b) the debt is not denied or contested by the government, or (c) the indebtedness arises under such government's or a predecessor's unconditional guarantee?

1. No such situation is known to exist.

2. FAA Sec. 620(d). If the loan is intended for construction or operation of any productive enterprise that will compete with U.S. enterprise, has the country agreed that it will establish appropriate procedures to prevent export to the U.S. of more than 20% of its enterprises annual production during the life of the loan?

2. The loan is not intended for such purposes.

3. FAA §620(e)(1). Has the country's government, or any agency or subdivision thereof, (a) nationalized or expropriated property owned by U.S. citizens or by any business entity not less than 50% beneficially owned by U.S. citizens, (b) taken steps to repudiate, or nullify existing contracts or agreements with such citizens or entity, or (c) imposes or enforced discriminatory taxes or other exactions, or restrictive maintenance or operation conditions? If so, and more than six months has elapsed since such occurrence, identify the document indicating that the government, or appropriate agency or subdivision thereof, has taken appropriate steps to discharge its obligations under international law toward such citizen or entity? If less than six months has elapsed, what steps if any has it taken to discharge its obligations?

3. No such actions are known to have occurred.

4. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action of U.S. property, and failed to take appropriate measures to prevent a recurrence and to provide adequate compensation for such damage or destruction?

4. No such situation is known to have occurred.

5. FAA Sec. 620(1). Has the government instituted an investment guaranty program under FAA Sec. 221 (b)(1) for the specific risks of inconvertibility and expropriation or confiscation?

5. Yes.

6. FAA §620(o). Fisherman's Protective Act of 1954, as amended, Section 5. Has the country seized, or imposed any penalty or sanction against, any U.S. fishing vessel on account of its fishing activities in international waters? If, as a result of a seizure, the U.S.G. has made reimbursement under the provisions of the Fisherman's Protective Act and such amount has not been paid in full by the seizing country, identify the documentation which describes how the withholding of assistance under the FAA has been or will be accomplished.

6. No.

7. FAA Sec. 620(q). Has the country been in default, during a period in excess of six months, in payment to the U.S. on any FAA loan?

7. No.

8. FAA Sec. 620(t). Have diplomatic relations between the country and the U.S. been severed? If so, have they been renewed?

8. Diplomatic relations between Korea and the United States have not been severed.

C. Relations with Other Nations and the U.N.

1. FAA Sec. 620(i). Has the country been officially represented at any international conference when that representation included planning activities involving insurrection or subversion directed against the U.S. or countries receiving U.S. assistance?

1. Korea is not know to have been so represented.

2. FAA Secs. 620(a), 620(n);
Has the country sold, furnished, or
permitted ships or aircraft under its
registry to carry to Cuba or North
Vietnam, items of economic, military
or other assistance?

2. No.

3. FAA Sec. 620(u); App.
Sec. 108. What is the status of the
country's U.N. dues, assessments or
other obligations? Does the loan
agreement bar any use of funds to pay
U.N. assessments, dues or arrearages?

3. The Republic of Korea is not a
member of the United Nations. The loan
agreement will stipulate that only
eligible commodities and services can
be procured with the proceeds of the
loan.

D. Military Situation

1. FAA Sec. 620(i). Has the
country engaged in or prepared for
aggressive military efforts directed
against the U.S. or countries
receiving U.S. assistance?

1. No.

2. FAA Sec. 620(s). What is
(a) the percentage of the country's
budget devoted to military purposes,
and (b) the amount of the country's
foreign exchange resources used to
acquire military equipment, and
(c) has the country spent money for
sophisticated weapons systems
purchased since the statutory
limitation became effective?

2. (a) For the period 1970-1973,
Korean defense budget expenditures have
averaged 4.2 percent of GNP. In 1973,
these expenditures were budgeted at
4.2 percent of GNP. Defense accounted
for 26 percent of the national budget
during 1970-1973 and 28 percent in 1973.

(b) Foreign exchange purchases of
military items have averaged less than
\$1 million annually in recent years, a
negligible portion of both the defense
budget and total imports.

(c) No.

Is the country diverting U.S. development assistance or PL 480 sales to military expenditures? Is the country diverting its own resources to unnecessary military expenditures? (Findings on these questions are to be made for each country at least once each fiscal year and, in addition, as often as may be required by a material change in relevant information.)

The Department of State and A.I.D. have reviewed Korean actions under the Symington Amendment and have concluded that Korea is not diverting U.S. development assistance or PL 480 sales to military purposes. They also determined that Korea is not diverting its own resources to unnecessary military expenditures to a degree which materially interferes with its development. The Country Team concurs.

II. CONDITION OF THE LOAN

A. General Soundness

Interest and Repayment

1. FAA §§201(d), 201(b)(2).

Is the rate of interest excessive or unreasonable for the borrower? Are there reasonable prospects for repayment? What is the grace period interest rate; the following period interest rate? Is the rate of interest higher than the country's applicable legal rate of interest?

The proposed loan contains a rate of interest which is concessionary. The borrower has the capacity to repay the loan at the rates of interest to be required. The rates in the proposed loan are 2% per annum during the grace period and 3% per annum thereafter for the remaining thirty years of the repayment period. The interest rate is not higher than the country's applicable legal rate of interest.

Financing

1. FAA §201(b)(1). To what extent can financing on reasonable terms be obtained from other free-world sources, including private sources within the U.S.?

Financing of this activity on terms comparable to those proposed for this loan is believed not to be available from other free-world sources, including private sources within the U.S.

Economic and Technical Soundness

1. FAA §§201(b)(2), 201(e).
The activity's economic and technical soundness to undertake loan; does the loan application, together with information and assurances, indicate that funds will be used in an economically and technically sound manner?
 1. The activity is economically and technically sound, and the loan application and other information available to the Mission indicates that the loan funds will be used in an economically and technically sound manner.
2. FAA §611(a)(1). Have engineering, financial, and other plans necessary to carry out assistance, and a reasonable firm estimate of the cost of assistance to the U.S., been completed?
 2. Yes, to the extent applicable.
3. FAA §611(b); App. §101.
If the loan or grant is for a water or related land-resources construction project or program, do plans include a cost-benefit computation? Does the project or program meet the relevant U.S. construction standards and criteria used in determining feasibility?
 3. Not applicable.
4. FAA §611(e). If this is a Capital Assistance Project with U.S. financing in excess of \$1 million, has the principal A.I.D. officer in the country certified as to the country's capability effectively to maintain and utilize the project?
 4. The principal A.I.D. officer in Korea has so certified (see Annex B).

B. Relation to Achievement of
Country and Regional Goals

Country Goals

1. FAA §§207, 281(a). What is this loan's relation to:

a. Institutions needed for a democratic society and to assure maximum participation on the part of the people in the task of economic development.

b. Enabling the country to meet its food needs both from its own resources and through development, with U.S. help, of infrastructure to support increased agricultural productivity.

c. Meeting increasing need for trained manpower.

d. Developing programs to meet public health needs.

e. Assisting other important economic, political, and social development activities, including industrial development; growth of free labor unions; cooperatives and voluntary agencies; improvement of transportation and communication systems; capabilities for planning and public administration; urban development; and modernization of existing laws.

1. The agricultural research project to be financed under this loan is directed specifically toward enabling Korea to better meet its food needs through increased production.

Otherwise, there is no direct relationship between the loan and the other institutional and developmental goals cited in these sections (207, 281(a)) of the FAA.

2. FAA §201(b)(4). Describe the activity's consistency with and relationship to other development activities, and its contribution to realizable long-range objectives.
 2. The proposed agricultural research project is totally consistent with the ROKG's overall efforts to increase the growth rate of the agriculture sector and improve the country's ability to meet its food needs.
3. FAA §201(b)(9). How will the activity to be financed contribute to the achievement of self-sustaining growth?
 3. The contribution of increased food production and higher rural incomes to self-sustaining growth is obvious.
4. FAA §201(f). If this is a project loan, describe how such project will promote the country's economic development, taking into account the country's human and material resource requirements and the relationship between ultimate objectives of the project and overall economic development.
 4. See 2. and 3. above.
5. FAA §201(b)(3). In what ways does the activity give reasonable promise of contributing to development of economic resources, or to increase of productive capacities?
 5. See 1., 2., and 3. above.
6. FAA §281(b). How does the program under which assistance is provided recognize the particular needs, desires, and capacities of the country's people; utilize the country's intellectual resources to encourage institutional development; and support civic education and training in skills required for effective participation in political processes.
 6. There is no direct relationship between the proposed project and the particular needs, desires, and capacities of the country's people, nor does the loan result in direct institutional development or civic education.

7. FAA §601(a). How will this loan encourage the country's efforts to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions?

8. FAA §202(a). Indicate the amount of money under the loan which is: going directly to private enterprise; going to intermediate credit institutions or other borrowers for use by private enterprise; being used to finance imports from private sources; or otherwise being used to finance procurements from private sources.

9. FAA §611(a)(2). What legislative action is required within the recipient country? What is the basis for a reasonable anticipation that such action will be completed in time to permit orderly accomplishment of purposes of loan?

Regional Goals

1. FAA §619. If this loan is assisting a newly independent country, to what extent do the circumstances permit such assistance to be furnished through multilateral organizations or plans?

2. FAA §209. If this loan is directed at a problem or an opportunity that is regional in nature, how does assistance under this loan encourage a regional development program? What multilateral assistance is presently being furnished to the country?

7. There is no direct relationship between this loan and the objectives stated in Sec. 601(a) of the Foreign Assistance Act, except for improving the technical efficiency of agriculture.

8. Approximately \$1.5 million of the loan will be used to finance procurement of equipment, materials and scientific literature from private sources. The \$3.5 million loan balance will be used to finance technical assistance and training.

9. No legislative action will be required as a condition precedent to this loan.

1. Korea is not a newly independent nation.

2. This loan is not directed specifically at a regional problem, but results of the research effort may well be regionally replicable.

Korea is a member of the Asian Development Bank (ADB) and is receiving

assistance from the World Bank. Both of these organizations are becoming increasingly active in Korea.

C. Relation to U.S. Economy

Employment, Balance of Payments,
Private Enterprise.

1. FAA §§201(b)(6); 102. What are the possible effects of this loan on U.S. economy, with special reference to areas of substantial labor surplus? Describe the extent to which assistance is constituted of U.S. commodities and services, furnished in a manner consistent with improving the U.S. balance of payments position.

2. FAA §§612(b); 636(h). What steps have been taken to assure that, to the maximum extent possible, foreign currencies owned by the U.S. and local currencies contributed by the country are utilized to meet the cost of contractual and other services, and that U.S. foreign owned currencies are utilized in lieu of dollars?

3. FAA §601(d); App. §109. If this loan is for a capital project, to what extent has the Agency encouraged utilization of engineering and professional services of U.S. firms and their affiliates? If the loan is to be used to finance direct costs for construction, will any of the contractors be persons other than qualified nationals of the country or qualified citizens of the U.S.? If so, has the required waiver been obtained?

1. There is no adverse effect from this loan on the U.S. economy or on areas of substantial labor surplus. Procurement will be from Code 941 countries with a large percentage expected to be of U.S. source and origin. Also, 50/50 shipping will apply.

2. The loan proceeds will be used exclusively to finance foreign exchange costs. All local currency costs will be financed by the host country.

3. Not applicable.

4. FAA §608(a). Provide information measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.

5. FAA §602. What efforts have been made to assist U.S. small business to participate equitably in the furnishing of commodities and services financed by this loan?

6. FAA §621. If the loan provides technical assistance, how is private enterprise on a contract basis utilized? If the facilities of other Federal agencies will be utilized, in what ways are they particularly suitable; are they competitive with private enterprise (if so, explain); and how can they be made available without undue interference with domestic programs?

7. FAA §611(c). If this loan involves a contract for construction that obligates in excess of \$100,000, will it be on a competitive basis? If not, are there factors which make it impracticable.

8. FAA §601(b). Describe the efforts made in connection with this loan to encourage and facilitate participation of private enterprise in achieving the purposes of the Act.

4. U.S. Government Excess Property is not appropriate for use in the activity to be financed hereunder.

5. Appropriate notice of this activity will be made so as to encourage participation by U.S. small businesses. Procurement procedures will follow normal commercial trade practices to the maximum extent allowable.

6. A portion of the loan will be used to finance technical assistance. However, the requirements of the project are such that the technical assistance will likely be obtained from universities, international institutions and other similar entities. It is unlikely that the facilities per se of other Federal agencies will be utilized.

7. The loan does not involve such a construction contract.

8. Other than the procurement activity mentioned above, there is no particular role for private enterprise in this project.

Procurement

1. FAA §602(a). Will commodity procurement be restricted to U.S. except as otherwise determined by the President?

1. Commodity procurement will be limited to A.I.D. Geographic Code 941 countries.

2. FAA §604(b). Will any part of this loan be used for bulk commodity procurement at adjusted prices higher than the market price prevailing in the U.S. at time of purchase?

2. No.

3. FAA §604(e). Will any part of this loan be used for procurement of any agricultural commodity or product thereof outside the U.S. when the domestic price of such commodity is less than parity?

3. No.

4. FAA §604(f). Will the agency receive the necessary pre-payment certification from suppliers under a commodity import program agreement as to description and condition of commodities, and on the basis of such, determine eligibility and suitability for financing?

4. Yes.

D. Other Requirements

1. FAA §201(b). Is the country among the 20 countries in which development loan funds may be used to make loans in this fiscal year?

1. Yes.

2. App. §106. Does the loan agreement provide, with respect to capital projects, for U.S. approval of contract terms and firms?

2. Any contracts financed by the loan will have such approval.

3. FAA §620(k). If the loan is for construction of a production enterprise, with respect to which the aggregate value of assistance to be furnished will exceed \$100 million, what preparation has been made to obtain the express approval of the congress?

3. Not applicable.

4. FAA §620(b), 620(f); App. §109(b). Has the President determined that the country is not dominated or controlled by the international Communist movement? If the country is a Communist country (including, but not limited to, the countries listed in FAA §620(f)) and the loan is intended for economic assistance, have the findings required by FAA §620(f) and App. §109(b) been made and reported to the Congress?

4. Yes, the required determination has been made.

5. FAA §620(h). What steps have been taken to insure that the loan will not be used in a manner which, contrary to the best interest of the United States, promotes or assists the foreign aid projects of the Communist-bloc countries?

5. The Loan Agreement will contain a provision covering this requirement.

6. App. §110. Will any funds be used to finance procurement of iron and steel products for use in Vietnam other than as contemplated by §110?

6. No.

7. FAA §636(i). Will any part of this loan be used in financing non-U.S.-manufactured automobiles? If so, has the required waiver been obtained?

7. Non-U.S.-manufactured automobiles will not be financed.

8. FAA §§620(a)(1) and (2), 620(p). Will any assistance be furnished or funds made available to the government of Cuba or the United Arab Republic?

8. No.

9. FAA §620(g). Will any part of this loan be used to compensate owners for expropriated or nationalized property? If any assistance has been used for such purpose in the past, has appropriate reimbursement been made to the U.S. for sums diverted?

9. No. No assistance has been used for such purposes in the past.

10. FAA §201(f). If this is a project loan, what provisions have been made for appropriate participation by the recipient country's private enterprise?
10. Not applicable.
11. App. §104. Does the loan agreement bar any use of funds to pay pensions, etc., for persons who are serving or who have served in the recipient country's armed forces?
11. Yes. The Loan Agreement will cover this requirement.
12. MMA §901.b. Does the loan agreement provide for compliance with U.S. shipping requirements, that at least 50% of the gross tonnage of all commodities financed with funds made available under this loan (computed separately by geographic area for dry bulk carriers, dry cargo liners, and tankers) be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates for U.S. flag vessels and that at least 50% of the gross freight revenue generated by all shipments financed with funds made available under this loan and transported on dry cargo liners be paid to or for the benefit of privately owned U.S. flag commercial vessels?
12. Yes.
13. App. §102. Have obligations for engineering and architectural fees and services over \$25,000 on any one project been reported to Congress bi-annually?
13. Not applicable.

14. FAA §481. Has the President determined that the recipient country has failed to take adequate steps to prevent narcotic drugs produced or procured in, or transported through, such country from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents or from entering the United States unlawfully? 14. No.
15. App. §111. Is the loan being used to transfer funds to world lending institutions under FAA §209(d) and §251(h)? 15. No.
16. App. §501. Are any of these funds being used for publicity or propaganda within the United States? 16. No.
17. FAA §612(d). Does the United States own host country excess foreign currency and, if so, what arrangements have been made for its release? 17. Korea is not an excess currency country.
18. FAA §604(d). Will provisions be made for placing marine insurance in the U.S. if the recipient country discriminates against any marine insurance company authorized to do business in the U.S.? 18. Yes. An appropriate provision will be included in the loan agreement